



Subject: NASA Safety and Health Programs

Responsible Office: Office of Safety and Mission Assurance and Office of Chief Health and Medical Officer

Table of Contents

Preface

- P.1 Purpose
- P.2 Applicability
- P.3 Authority
- P.4 Applicable Documents and Forms
- P.5 Measurement/Verification
- P.6 Cancellation

Chapter 1. Introduction

- 1.1 Overview
- 1.2 Organization of the NPR

Chapter 2. Roles and Responsibilities

- 2.1 NASA Administrator
- 2.2 Chief Health and Medical Officer
- 2.3 Chief, Safety and Mission Assurance
- 2.4 Center Directors
- 2.5 Center Safety and Mission Assurance Director
- 2.6 Center Institutional Safety Discipline Leads
- 2.7 Program and Project Personnel
- 2.8 Procurement Officials

Chapter 3. Management of Institutional Safety Requirements and Request for Relief from Agency Institutional Safety Requirements

- 3.1 Management of Institutional Safety Requirements
- 3.2 Request for Relief from Agency Institutional Safety Requirements

Chapter 4. NASA's Safety and Health Management Program

- 4.1 Center Safety and Health Management Program
- 4.2 Referenced Standards
- 4.3 Safety and Health Management Program Elements

Chapter 5. Fire Protection and Life Safety

- 5.1 Fire Protection and Life Safety Program
- 5.2 Institutional Safety Discipline Lead Designation – Authority Having Jurisdiction
- 5.3 Referenced Standards
- 5.4 Fire Protection and Life Safety Unique Requirements – Reserved
- 5.5 Authority Having Jurisdiction Qualifications

Chapter 6. Explosive, Propellant, and Pyrotechnic Safety

- 6.1 Explosives, Propellants, and Pyrotechnics Safety Program
- 6.2 Institutional Safety Discipline Lead Designation – Explosives Safety Officer
- 6.3 Referenced Standards
- 6.4 Explosives, Propellants, and Pyrotechnics Unique Requirements
- 6.5 Explosives Safety Officer Qualifications

Chapter 7. Ground-based Pressure Vessels and Pressurized Systems Safety

- 7.1 Ground-based Pressure Vessels and Pressurized Systems Program
- 7.2 Institutional Safety Discipline Lead Designation – Pressure Systems
- 7.3 Referenced Standards
- 7.4 Pressure Vessels and Pressurized Systems Unique Requirements
- 7.5 Pressure Systems Manager Qualifications

Chapter 8. Lifting Devices and Equipment Safety

- 8.1 Lifting Devices and Equipment Program
- 8.2 Institutional Safety Discipline Lead Designation – Lifting Devices and Equipment Manager
- 8.3 Referenced Standards
- 8.4 Lifting Devices and Equipment Unique Requirements
- 8.5 Lifting Devices and Equipment Manager Qualifications

Chapter 9. Fall Protection

- 9.1 Fall Protection Program
- 9.2 Institutional Safety Discipline Lead Designation – Fall Protection Program Administrator
- 9.3 Referenced Standards
- 9.4 Fall Protection Unique Requirements – Reserved
- 9.5 Fall Protection Program Administrator Qualifications

Chapter 10. Aviation Safety

- 10.1 Aviation Safety Program
- 10.2 Aviation Safety Program Responsibilities

Chapter 11. Radiation Safety

- 11.1 Non-Ionizing Radiation

11.2 Ionizing Radiation

Chapter 12. Mission Collateral Safety Risk

12.1 Overview

12.2 Range Flight Safety

12.3 Payload Safety

12.4 Nuclear Flight Safety

12.5 Flight Pressure Vessels and Pressurized Systems Safety

Chapter 13. Operational Safety Specific Program Requirements

13.1 Overview

13.2 Motor Vehicle Safety

13.3 Personal Protective Equipment

13.4 Control of Hazardous Energy (Lockout / Tagout Program)

13.5 Confined Space

13.6 Electrical Safety

13.7 Hazardous Material Transportation, Storage, and Use

13.8 Test / Operations Safety

13.9 Human and Animal Research / Tests

13.10 Underwater Operations Safety

Chapter 14. Facility Safety Management

14.1 Purpose

14.2 Facility Safety Management Program

14.3 Organization and Personnel Designation – Facility Safety Management Program

14.4 Facility Safety Requirements

Appendix A. Definitions

Appendix B. Acronyms

Appendix C. References

Appendix D. Example Request For Relief Form

Preface

P.1 Purpose

This directive describes the roles and responsibilities, the required safety and health programs, and the associated Agency requirements that provide the framework for the Agency's Safety and Health Program. The purpose of this program is to protect the public, NASA workforce, and high-value assets from all hazards associated with NASA activities and operations created or controlled by NASA and to protect NASA civil servants while performing official NASA duties from any hazard, regardless of location.

P.2 Applicability

- a. This directive is applicable to NASA Headquarters and NASA Centers, including Component Facilities and Technical and Service Support Centers.
- b. In this directive, "Center Director" refers to the Center Directors, to the Executive Director, Headquarters Operations, and to the directors of Component Facilities and Technical and Service Support Centers.
- c. In this directive, the term "Project Manager" refers to both project managers and program managers.
- d. In this directive, the term "workforce" refers to the NASA civil servants and NASA contractors.
- e. In this directive, the term "public" refers to non-NASA workforce (i.e. tenants), visitors, and the general public.
- f. Unless specifically prohibited, responsibilities and requirements may be delegated. When delegated, the stated role or actor still remains accountable for its implementation and outcome.
- g. Where an office or organization is stated as the actor of a requirement, the Official in Charge of that office or organization is responsible and accountable for the action and its outcome.
- h. In this directive, all mandatory actions (i.e., requirements) are denoted by statements containing the term "shall." The terms "may" denotes a discretionary privilege or permission, "can" denotes statements of possibility or capability, "should" denotes a good practice and is recommended, but not required, "will" denotes expected outcome, and "are/is" denotes descriptive material.
- i. In this directive, all prohibited actions are denoted by statements containing the term "shall not."
- j. Where conflicts exist between provisions of this directive and Federal statutes or regulations, or higher-level NASA directives, those statutes, regulations, and higher-level NASA directives take precedence.

k. Where conflicts exist between a general requirement and specific requirement, the specific requirement applies.

l. Codes and standards incorporated by reference in this directive are considered to be part of the requirements of this directive to the prescribed extent of each such reference. Where conflicts exist between provisions of this directive and provision of standards incorporated by reference herein, the provisions of this directive take precedence, except in those cases where the standard is incorporated by reference in applicable Federal statute or regulation.

m. In this directive, all document citations are assumed to be the latest version unless otherwise noted. When a specific version is stated, use of more recent versions of cited documents may be authorized by the responsible Institutional Safety Discipline Lead.

P.3 Authority

a. NPD 1000.3, The NASA Organization.

b. NPD 1800.2, NASA Occupational Health Program.

c. NPD 8700.1, NASA Policy for Safety and Mission Success.

P.4 Applicable Documents and Forms

a. Basic Program Elements for Federal Employee Occupational Safety and Health Programs and Related Matters, 29 CFR pt. 1960.

b. Hazardous Materials Regulation, 49 CFR subch. C.

c. NPR 8621.1, NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping.

d. NASA-STD-8719.9, Lifting Standard.

e. NASA-STD-8719.11, Standard for Fire Protection and Life Safety.

f. NASA-STD-8719.12, Safety Standard for Explosives, Propellants, and Pyrotechnics.

g. NASA-STD-8719.17, NASA Requirements for Ground-Based Pressure Vessels and Pressurized Systems (PVS).

h. NF 1584, Safety and Health Hazard Abatement Plan.

i. NRRS 1441, NASA Records Retention Schedules.

j. American Conference of Governmental Hygienists (ACGIH) Industrial Ventilation: A Manual of Recommended Practice for Design, 28th Edition, 2016.

k. ANSI/AIAA S-080A-2018, Space Systems – Metallic Pressure Vessels, Pressurized Structures, and Pressure Components.

- l. ANSI/AIAA S-081B-2018, Space Systems – Composite Overwrapped Pressure Vessels.
- m. ANSI/ASSP Z9.1-2016, Ventilation and Control of Airborne Contaminants During Open-Surface Tank Operations.
- n. ANSI/ASSP Z9.2-2018, Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems.
- o. ANSI/ASSP Z9.3-2017, Spray Finishing Operations: Safety Code for Design, Construction and Ventilation.
- p. ANSI/ASSP Z9.4-2011, Abrasive-Blasting Operations – Ventilation and Safe Practices for Fixed Location Enclosures.
- q. ANSI/ASSP Z9.5-2012, Laboratory Ventilation.
- r. ANSI/ASSP Z9.6-2018, Exhaust Systems for Grinding, Polishing and Buffing.
- s. ANSI/ASSP Z9.7-2007, Recirculation of Air from Industrial Process Exhaust Systems.
- t. ANSI/ASSP Z9.10-2017, Fundamentals Governing the Design and Operation of Dilution Ventilation Systems in Industrial Occupancies.
- u. ANSI/ASSP Z9.11-2016, Laboratory Decommissioning.
- v. ANSI/ASSP Z9.14-2014, Testing and Performance-Verification Methodologies for Ventilation Systems for Biosafety Level 3 (BSL-3) and Animal Biosafety Level 3 (ABSL-3) Facilities.
- w. ANSI/ISEA Z358.1-2014, American National Standard for Emergency Eyewash and Shower Equipment.
- x. ANSI/ASSP Z359.2-2017, Minimum Requirements for a Comprehensive Managed Fall Protection Program.
- y. International Building Code (IBC), 2018 edition.
- z. NFPA 70, National Electric Code, 2017 edition.
- aa. NFPA 70E, Standard for Electrical Safety in the Workplace, 2018 edition.
- bb. NFPA 101, Life Safety Code, 2018 Edition.
- cc. The Guide for the Care and Use of Laboratory Animals (The Guide), Eighth Edition, 2011, National Academy Press, Washington D.C.
- dd. The IEEE National Electrical Safety Code, 2017 edition.

P.5 Measurement/Verification

Compliance with the requirements contained in this directive is monitored by the Institutional Safety Discipline Leads, the Institutional Safety Authorities, the project Safety and Mission Assurance Technical Authority, the NASA Office of Safety and Mission Assurance, and the Office of the Chief Health and Medical Officer. Compliance may also be verified as part of selected life cycle reviews and by assessments, reviews, and audits of the requirements and processes defined within this directive.

P.6 Cancellation

- a. NPR 8715.1A, NASA Occupational Safety and Health Programs, dated March 05, 2012.
- b. NPD 8710.5D, Policy for Pressure Vessels and Pressurized Systems, dated March 12, 2008.
- c. Chapters 3, 4, 5, 7, and 8 of NPR 8715.3D, NASA General Safety Program Requirements, dated August 01, 2017.

Chapter 1. Introduction

1.1 Overview

1.1.1 This directive describes how NASA manages its responsibilities for protecting the public and the workforce from hazards associated with NASA activities and operations. The directive describes the roles and responsibilities, the required institutional safety and health programs, and the Agency requirements for protecting the public and workforce. This directive provides a framework for how NASA manages institutional safety and health. It is intended to be used with other applicable statutes and regulations and Agency and Center requirements.

1.1.2 Institutional safety and health management is a proactive, collaborative process to find and fix hazards associated with NASA activities and operations before someone is injured or becomes ill. It is the application of engineering and management principles, criteria, and techniques to protect the public, workforce, and property from hazards created by NASA activities and operations and to protect the NASA civil service employees from all hazards regardless of location while performing official NASA duties. Its objective is to keep the risk of injury and harm to these entities within acceptable limits.

1.2 Organization of the NPR

1.2.1 Chapter 2 defines the roles and responsibilities for implementing this directive. Chapter 3 describes management of institutional safety requirements and the process for requesting relief from institutional safety requirements in this document and requirements incorporated by reference herein.

1.2.2 Chapters 4 through 9 address safety functional areas where NASA requires the Centers to have a designated Center Institutional Safety Discipline Lead and for which this NPR is the controlling directive.

1.2.3 Chapter 10 addresses aviation safety and delegates oversight of aviation safety to the Aircraft Management Division in the Mission Support Directorate. Chapter 11 addresses radiation safety and references other controlling directives. Chapter 12 addresses functional institutional safety areas tied more directly to missions. These areas are range flight safety, payload safety, nuclear flight safety, and flight pressure vessels and pressurized systems.

1.2.4 Chapter 13 and Chapter 14 address operational specific safety areas and facility safety management.

Chapter 2. Roles and Responsibilities

2.1 NASA Administrator

The NASA Administrator is responsible for the implementation of an effective and comprehensive safety and health management system consistent with the standards promulgated under the Occupational Safety and Health Act, 29 U.S.C. § 655 and the Basic Program Elements for Federal Employee Occupational Safety and Health Programs and Related Matters, 29 CFR pt. 1960. The Administrator designated (in NPD 1000.3, The NASA Organization) the Chief Health and Medical Officer (CHMO) as the Designated Agency Safety and Health Official (DASHO) for the Agency. The DASHO in conjunction with the Chief, Safety and Mission Assurance is responsible for managing the Agency occupational safety and health management system for the Administrator.

2.2 Chief Health and Medical Officer

The Chief Health and Medical Officer, serving as the DASHO, establishes and oversees implementation of the health portion of the safety and health management policies required by 29 CFR § 1960.1. The Agency health management policy and program are defined in NPD 1800.2, NASA Occupational Health Program and NPR 1800.1, NASA Occupational Health Program Procedures.

2.3 Chief, Safety and Mission Assurance

The Chief, Safety and Mission Assurance (SMA) establishes and oversees implementation of the safety portion of the safety and health management policy required by 29 CFR § 1960.1 and the safety programs and requirements delineated in this NPR. The Agency safety management policy and program are defined in NPD 8700.1, NASA Policy for Safety and Mission Success, and this NPR.

2.4 Center Directors

2.4.1 Center Directors are responsible and accountable for the safety and health aspects of all activities assigned to their Center. Institutional Safety Authority at a Center originates with the Center Director.

Note: Elements of the Center's safety and health programs may reside in different organizations and may be funded or managed either locally at the Center or centrally by the Agency. Regardless of the organizational structure, the Center Director's responsibility for the safety and health of their workforce and for the impact of hazards the Center controls remains undiminished.

2.4.2 Each Center Director is responsible for protecting the workforce and the public from hazards created or controlled by the Center regardless of location.

2.4.3 Each Center Director is responsible for the safety and health of all NASA civil service employees assigned to their Center and for protecting them from all hazards regardless of location while performing official NASA duties.

2.4.4 Each Center Director is responsible, when entering into contracts and agreements, for ensuring they maintain the ability to fulfill their responsibilities in 2.4.2 and 2.4.3.

Note: If the Center enters into an out-grant with another party, in which the other party maintains exclusive use and control over that real property, the Center is not responsible for the risks to the other party's workforce arising from hazards the other party creates or controls, unless otherwise specified in the out-grant. The Center remains responsible for protecting the NASA workforce from all hazards, including those created or controlled by the party of the out-grant, and responsible for the impact that hazards NASA creates or controls may have on the party of the out-grant.

2.4.5 Each Center Director is responsible for Center implementation of Agency institutional safety policies and statutory and regulatory requirements.

2.4.6 Each Center Director is responsible for prohibiting or stopping any activity or operation for which the Center cannot provide adequate safety or emergency response.

2.4.7 Center Directors may accept risk to the public, the workforce, or property as long as relief from Agency-level requirements is obtained in accordance with Chapter 3 of this directive.

2.4.8 Center Directors implicitly accept the risks associated with the current state of the Center, including from decisions and relief from requirements made by subordinates and by predecessors. Center Directors should thus be aware of and periodically review all past requests for relief that are still applicable.

2.4.9 Each Center Director is responsible for reporting annually on the state of the safety and health of their Center and of their safety and health programs to the Chief, SMA and the CHMO.

2.4.10 Each Center Director is responsible for designating qualified civil servants as Center Institutional Safety Discipline Leads to manage safety policies and programs in specific discipline areas and to oversee their implementation.

2.4.11 Each Center Director is responsible for designating qualified civil servants as Environmental Health Manager, Laser Safety Officer (LSO), and Radiation Safety Officer (RSO). The roles and responsibilities of the LSO and RSO are addressed in NPR 1800.1, NASA Occupational Health Program Procedures, and are overseen by the CHMO.

2.5 Center Safety and Mission Assurance Director

2.5.1 The Center SMA Director assists the Center Director in managing Center institutional safety policies and programs in compliance with Agency policy and statutory and regulatory requirements.

2.5.2 The Center SMA Director provides a clear picture of the full risk posture of the Center relative to the safety and health requirements.

2.6 Center Institutional Safety Discipline Leads

2.6.1 Center Institutional Safety Discipline Leads are inherently governmental functions and may only be performed by civil servants. They may be supported by contractors. Required Center Institutional Safety Discipline Leads are:

- a. Authority Having Jurisdiction (AHJ) for Fire Protection and Life Safety,
- b. Center Range Flight Safety Lead (CRFSL),
- c. Explosives Safety Officer (ESO),
- d. Fall Protection Program Administrator (FPPA),
- e. Safety Manager,
- f. Lifting Devices and Equipment Manager (LDEM), and
- g. Pressure Systems Manager (PSM).

2.6.2 Center Directors may designate additional Institutional Safety Discipline Leads not defined in this document according to their needs.

2.6.3 Responsibilities of the Center Institutional Safety Discipline Leads vary depending on their discipline areas. Specific roles and responsibilities for Center Institutional Safety Discipline Leads are documented in chapters 4 through 12 and other NPRs as cited above. Responsibilities common to all discipline areas are:

- a. Oversee Center activities to ensure they are safe and conform to Agency, Center, and regulatory policy and requirements; authorize equipment, materials, installations, and procedures for use; specify personnel competence and qualifications; and define additional requirements and standards necessary to maintain safety.
- b. Prohibit or stop any work or activity that presents an imminent hazard to the life or limb of personnel.
- c. Stop any work that requires prior approval by an Institutional Safety Discipline Lead that has not obtained that approval.
- d. Collaborate with programs, projects, and procurement officials on how best to implement prescribed requirements and achieve program and project goals in accordance with all statutory and regulatory responsibilities.
- e. Evaluate the technical basis of requests for relief from requirements and provide a recommendation to the approving authority.
- f. Notify the Center SMA Director of any unsafe conditions, work stoppages, policy and requirements violations, and other events and conditions that may increase the risk to the public, workforce, or property.

g. Periodically inform the Center SMA Director of the state of the safety program they lead at their Center and risks to the satisfactory implementation of program requirements.

h. In coordination with the Center SMA Director, inform the Chief, SMA and CHMO of any unsafe conditions, work stoppages, policy and requirements violations, and other events and conditions that may significantly increase the risk to the health of the public and workforce.

2.6.4 Designated Center Institutional Safety Discipline Leads may only authorize activities within their discipline and domain. The Center Institutional Safety Discipline Leads cannot authorize activities that increase risk to the public, the workforce, or property beyond what is allowed by applicable standards, or beyond what has been accepted in accordance with Chapter 3.

2.7 Program and Project Personnel

2.7.1 Mission Directorate Associate Administrators are responsible for ensuring project managers work with the appropriate Center personnel to implement the requirements of this NPR.

2.7.2 Project managers are responsible for working with the appropriate Center personnel to implement the requirements of this NPR.

2.7.3 Chief Safety Officers are responsible for assisting project managers meet the requirements of this NPR. To enable this, they need to be aware of the requirements in this NPR and who to contact for assistance in meeting its requirements.

2.8 Procurement Officials

2.8.1 Associate Administrator for the Office of Procurement is responsible for ensuring Center and Agency procurement processes, including P-card and simplified acquisition processes, include the appropriate steps to enable meeting the requirements of this NPR and applicable standards incorporated by reference herein.

2.8.2 Procurement officials and P-card holders are responsible for:

a. Including in contracts, acquisitions, and P-card purchases the requirements of this NPR and applicable standards incorporated by reference herein.

b. Ensuring the appropriate Institutional Safety Discipline Leads are included in the procurement process or review of P-card purchases prior to being initiated so that they can conduct appropriate reviews and provide advice as required.

Chapter 3. Management of Institutional Safety Requirements and Request for Relief from Agency Institutional Safety Requirements

3.1 Management of Institutional Safety Requirements

3.1.1 Institutional Safety Authority

3.1.1.1 NASA's governance framework is designed to include a comprehensive system of independent authorities. Institutional Safety Authority, the implementation of which is overseen by the Chief, Safety and Mission Assurance (SMA), ensures Agency compliance with safety requirements to protect the safety of the workforce, public, and high-value assets established by law, NASA policy, or other external or internal authority.

3.1.1.2 Institutional Safety Authority at Centers and Facilities resides with the Center Directors. They serve as the designated Agency-level "official voice" for institutional safety and the associated requirements established by NASA policy, law, and other external mandate aimed at protecting the public, NASA workforce, and high-value assets from potential harm.

3.1.1.3 SMA Directors assist Center Directors with the implementation of the Institutional Safety Authority and serve as the Center focal point for Institutional Safety Authority providing independent oversight and communication lines to both the Center Director and Chief, SMA.

3.1.1.4 Centers may designate additional positions within their organization as members of the Institutional Safety Authority. Centers shall document all such positions.

3.1.2 Institutional Safety Discipline Leads

3.1.2.1 Centers shall appoint Institutional Safety Discipline Leads as defined in section 2.6.

3.1.2.2 Institutional safety discipline leads support the implementation of the Institutional Safety Authority by serving as subject-matter experts for the safety discipline they oversee. Common duties include the development of policies, requirements, process, and procedures to manage their discipline area at the Center and Facilities, and the determination of requirements applicability, compliance, and equivalent levels of safety.

3.1.2.3 In case of disagreement with determinations by Institutional Safety Discipline Leads, organizations may appeal such determinations to the SMA Director or Center Director.

3.1.2.4 Authority to conduct Center operations once a determination of noncompliance has been made can only be provided in accordance with section 3.2.

Note: If a determination of noncompliance has been made for a project operation that does not impact the public, NASA workforce, or NASA facility, the institutional safety authority may allow the request for relief to be obtaining using the projects process.

3.1.2.5 Regardless of the organization in which Institutional Safety Discipline Leads reside, Centers shall maintain independent communication paths between those leads and the SMA Director, then to the Center Director, to avoid undue influence on their functioning.

3.2 Request for Relief from Agency Institutional Safety Requirements

3.2.1 Overview

3.2.1.1 It is NASA policy that all requirements are complied with unless relief is formally granted. An approved request for relief is a documented authorization releasing a responsible party from meeting a requirement. All documented authorizations of relief become part of the organization's records.

Note: Requests for relief are frequently referred to as either waivers or deviations.

3.2.1.2 Policy and responsibilities cannot be relieved. The only way to make a change or alteration to a policy is to formally and universally change the policy. Responsibilities can only be reassigned.

3.2.1.3 NASA cannot authorize relief from external requirements, such as Federal, state, or local regulations, voluntary consensus standards incorporated by reference in Federal regulations, or NASA standards approved as alternate or as supplementary to a Federal standard. Requests for relief from a Federal, state, or local safety regulation are reviewed by the NASA Headquarters Office of Safety and Mission Assurance and submitted by the Designated Agency Safety and Health Official to the appropriate Federal, state, or local agency for approval.

Note: State and Local regulations and standards do not apply to Federal activities and installations, except as otherwise provided by Federal law or express agreement.

3.2.1.4 This chapter is only for relief to Agency institutional safety requirements for which OSMA is the Office of Primary Responsibility. Relief from Agency institutional health requirements can only be granted by OCHMO.

Note: Relief from Agency institutional health requirements can only be granted by OCHMO. If Submitting Authority's request includes institutional health requirements, contact Center health officials.

3.2.2 Approving Authority for Requests for Relief

3.2.2.1 As defined in NPR 1400.1, NASA Directives and Charters Procedural Requirements, the Approving Authority is the person or organization responsible for oversight of the requirement and authorized to grant relief from the requirement.

3.2.2.2 The Approving Authority shall elevate requests for relief exceeding his or her authority. The Approving Authority cannot authorize relief from externally mandated requirements (e.g., Federal statutes and regulations) or from NASA requirements not under its purview.

3.2.2.3 The Chief, SMA delegates approving authority to the applicable Center Director except as stated in 3.2.2.4.

3.2.2.4 The Approving Authority for granting relief is the Chief, SMA when the relief is for:

- a. An entire standard or substantial portion of a standard incorporated by reference in this directive or a substantial portion of this directive.
- b. Relief from requirements in section 3.1 of this document.
- c. A request for relief that requires coordination between centers or impacts the public not located near the Center.

Note: For a request for relief that impacts the public not located near the Center, the Chief, SMA may need to elevate granting the relief to the Administrator in accordance with NPD 8700.1.

3.2.2.5 Center Directors may delegate their authority to grant relief from requirements to the Deputy Director, Associate Director, or SMA Director with the following stipulations:

- a. The Center Director remains responsible for the relief granted and for the impact of the relief.
- b. Center Directors shall not delegate the authority below the Deputy Director or Associate Director if after risk reduction measures are taken the risk of noncompliance is assessed by the appropriate Institutional Safety Discipline Lead to be more than a minor increase to personnel injury or a significant risk to property.

3.2.3 The Submitting Authority for Requests for Relief

3.2.3.1 The Submitting Authority is the person or organization seeking relief. The Submitting Authority shall document the following information:

- a. Identify the requirement(s) for which relief is being sought.
- b. Describe the request for relief (i.e., the nature of the proposed departure from the requirement).
- c. Justify the reasons for the relief, why it is not possible, or desirable, to comply with the requirement within the specified delivery schedule.
- d. Determine the initial and residual risk and document the acceptability of the resulting change in risk.
- e. Confirm the relief does not conflict with applicable Federal statutes or regulations, or with Agency policy.
- f. Indicate when compliance will be achieved or indicate that the request is permanent if compliance is not planned or not possible.
- g. Describe alternate actions to be taken for managing the risk.

h. Describe conclusions and recommendations from the Center Institutional Safety Discipline Lead, resolution of recommendations, and if a recommendation to not approve is made by an Institutional Safety Authority, an explanation why it was made.

3.2.3.2 The Submitting Authority accepts the risk associated with the relief when submitting the request for relief. Relief is not granted until the request has been fully processed and approved by the Approving Authority.

3.2.3.3 Regardless of whether the Center Director is the Submitting or Approving Authority, the Center Director is and remains accountable for the safety of people and property at the Center and for the impact of hazards created or controlled by the Center, including accountability for accepting risks associated with the relief from requirements.

3.2.3.4 Appendix D provides an example Request for Relief (RFR) form. This form is not mandatory. Centers may use other methods of documentation provided relevant information to shown compliance with this NPR is captured.

3.2.4 The appropriate Institutional Safety Authorities and Institutional Safety Discipline Leads shall review and provide a recommendation to approve or disapprove, with appropriate comments, for the Approving Authority to consider when making a final decision to approve or disapprove the request for relief.

3.2.5 Any Institutional Safety Authority or Institutional Safety Discipline Lead may request the addition of an OSMA assessment for the Approving Authority to consider when making a final decision to approve or disapprove the request for relief.

3.2.6 Institutional Safety Authorities shall ensure substantive disagreements are handled through the formal dissent process outlined in NPD 1000.0.

3.2.7 Reporting Authorized Relief

3.2.7.1 For relief authorized at the Center, the Approving Authority shall inform OSMA of any granted relief to Agency requirements with more than a minor increase to personnel injury or a significant risk to property.

3.2.7.2 Center SMA Director shall provide request for relief information upon request from OSMA.

3.2.7.3 Center Institutional Safety Discipline Leads shall report annually to the Center Director and OSMA all active granted reliefs from requirement in their area of responsibility.

3.2.7.4 The Center does not need to report relief from requirements in standards adopted voluntarily by the Center. The Center shall provide these requests for relief upon request. This is to evaluate the Center's safety and health management, quality assurance, and risk management processes.

Verify Current version before use at:
<https://nodis3.gsfc.nasa.gov/>

3.2.8 Records of Relief

Centers shall maintain records of requests for relief according to the NRRS 1441.1, NASA Records Retention Schedules.

Verify Current version before use at:
<https://nodis3.gsfc.nasa.gov/>

Chapter 4. NASA's Safety and Health Management Program

This section describes the framework the Agency's Safety and Health Management Program is based on and the requirements to establish that framework. This section is organized according to the seven core safety and health management system elements described in OSHA 3885, Recommended Practices for Safety and Health Programs: management leadership, worker participation, hazard identification and assessment, hazard prevention and control, education and training, program evaluation and improvement, and communication and coordination on joint employer and multiemployer worksites.

Note: The scope and frequency of Agency led audits may be reduced for Centers with a recognized safety and health management program regularly evaluated by a third party such as OSHA, and that report regularly to the DASHO and Chief, SMA including findings of self-audits. Once a Center is recognized for reduced agency audits, it will be documented and reviewed for continued applicability every three years.

4.1 Center Safety and Health Management Program

4.1.1 Each Center shall document and implement an effective and comprehensive safety and health management program for their Center to protect the public, workers, and property consistent with Agency safety and health management policy and requirements.

4.1.2 Each Center shall actively promote a strong safety culture. This is accomplished through actions such as reporting safety concerns and incidents, participating in safety and health awareness activities, engaging in safe behaviors, and sharing relevant lessons to improve mission success and safety. Additional information regarding NASA's Safety Culture is available in NASA-HDBK-8709.24.

4.1.3 The Center Director shall appoint in writing a Safety Manager who is the Institutional Safety Discipline Lead with the technical knowledge and experience to lead and implement the Center's safety management program.

4.1.4 The Center Director shall appoint in writing an Environmental Health Manager with the technical knowledge and experience to implement the Center's environmental health management program.

4.1.5 The Center Director shall ensure the Center's organizational structure and funding provides the Safety Manager and Environmental Health Manager sufficient authority, responsibility, and resources (e.g., safety and health staff, equipment, materials, and training) to implement an effective safety and health program.

4.2 Referenced Standards

4.2.1 The Safety Manager and Environmental Health Manager shall assist the Center Director in establishing and maintaining a safety and health management program for the Center (see 29 CFR §1960.6(b)). The following recognized safety and health program frameworks are frequently used:

- a. OSHA 3885, Recommended Practices for Safety and Health Programs, <https://www.osha.gov/shpguidelines/>
- b. CSP 03-02-003, Voluntary Protection Programs (VPP): Policies and Procedures Manual (2008),
- c. 54 FR 3904–39, OSHA Safety and Health Program Management Guidelines (1989),
- d. ANSI/ASSP Z10, Occupational Health and Safety Management Systems,
- e. ILO-OSH 2001, Guidelines on Occupational Safety and Health Management Systems,
- f. OHSAS 18001, Occupational Health and Safety Assessment Series,
- g. ISO 45001:2018, Occupational Health and Safety Management Systems -- Requirements with Guidance for Use, and
- h. National Safety Council's (NSC's) Journey to Safety Excellence.

4.3 Safety and Health Management Program Elements

4.3.1 Management Leadership

4.3.1.1 Center management demonstrates a commitment to safety and health by providing the leadership, vision, and resources needed to implement an effective safety and health management program.

4.3.1.2 Center senior management shall establish safety and health goals and objectives directed toward continuous program improvement.

4.3.1.3 Managers at all levels shall take actions to create a positive safety culture, communicate to employees the importance of safety and health, encourage employee participation in the safety and health management program, and ensure employees comply with all safety and health requirements.

4.3.2 Worker Participation

4.3.2.1 Each Center shall enable workforce participation in the safety and health management program by providing them:

- a. Opportunities to participate in all aspects the safety and health management program.
- b. The necessary time and resources to participate in the program.
- c. Access to the safety and health information needed to understand hazards and control measures in the workplace.
- d. An environment that encourages employees to communicate freely and easily about safety and health issues without fear of retaliation.

e. A process to report hazards and other safety and health concerns that also provides feedback to employees who submit hazards or concerns.

Note: This includes providing workers access to the NASA Safety Reporting System (NSRS, <https://sma.nasa.gov/sma-disciplines/nsrs>) and awareness that any worker has the right to report a safety or health concern to OSHA)

4.3.2.2 Each Center shall acknowledge and provide positive reinforcement to those who participate in the safety and health management program and provide positive recognition for meeting or exceeding safety and health goals (e.g., reporting close calls and near misses, attending training, conducting inspections).

4.3.2.3 Each Center shall empower the workforce to initiate or request a temporary suspension or shutdown of any work activity or operation they believe to be an imminent hazard to the life or limb of personnel.

4.3.3 Hazard Identification and Assessment

4.3.3.1 Each Center shall conduct hazards analysis of new and changes to existing facilities, equipment, and operations to identify hazards.

Note: The complexity, attributes of the new item/change, and risk to personnel/equipment should be considered when determining the appropriate hazard analysis to perform.

4.3.3.2 Each Center shall conduct annual safety and health inspections to identify hazards; evaluate existing control measures; and verify that work practices, administrative controls, and personal protective equipment use policies are being followed.

4.3.3.3 Each Center shall implement a process to assess, characterize, document, and communicate identified hazards.

4.3.3.4 Each Center shall notify the supervisor in charge of the work area within 15 days of identification of any hazard and within 30 days for health violations.

4.3.4 Hazard Prevention and Control

4.3.4.1 Each Center shall prevent and control identified hazards to protect the public and workforce from injury and illness and to provide the workforce with safe and healthful working conditions. The Center should implement the most effective and feasible controls based on the hierarchy of controls (see figure 4-1).

4.3.4.2 For operations involving common industry hazards (e.g., lock-out/tag-out and working on or near exposed energized parts) with a high potential to result in loss of life, serious injury or illness to personnel, or substantial damage to systems, equipment, or facilities, each Center shall document procedures that meet the requirements of 13.8.3.

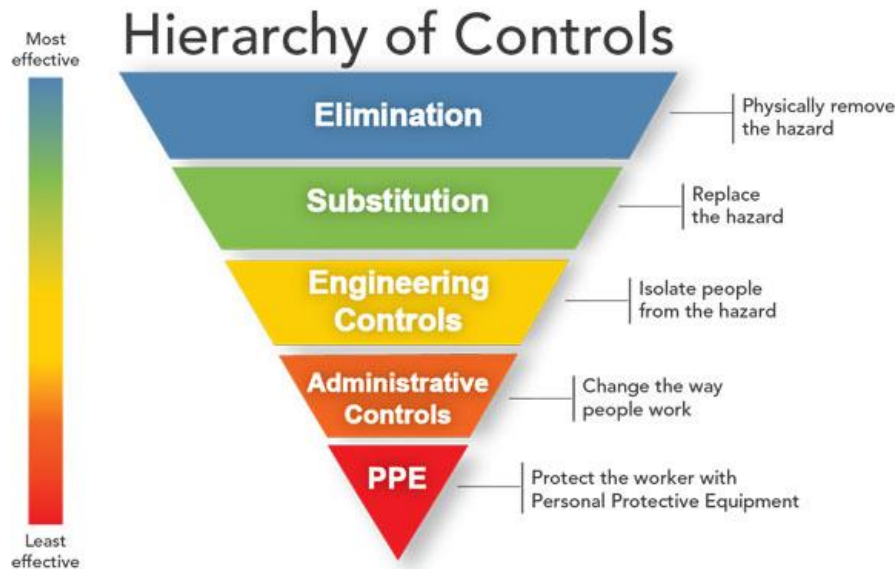


Figure 4-1. Hierarchy of Controls. *Source NIOSH.*

4.3.4.3 For operations and tests involving unique hazardous phenomena associated with complex NASA activities, each Center shall meet the requirements of 13.8.

4.3.4.4 Each Center shall implement a closed-loop process to ensure identified hazards are controlled to an acceptable level.

4.3.4.5 For hazards with a high potential to result in loss of life, serious injury or illness to personnel, the Center shall:

- a. Immediately eliminate the hazard or use interim controls while it develops and implements longer-term solutions.
- b. Develop and update a hazard control plan (e.g., NF 1584, Safety and Health Hazard Abatement Plan) describing how the selected controls will be implemented.
- c. Track progress toward completing the control plan and periodically verify that interim controls remain effective.

4.3.5 Education and Training

4.3.5.1 Each Center shall establish and maintain a safety training and certification program to implement Federal regulations and NASA requirements to ensure workers are trained and medically able to safely perform their jobs and identify and control hazards associated with their tasks.

4.3.5.2 Each Center shall train all managers and supervisors on their roles and responsibilities for ensuring employee safety and health and developing a positive safety culture.

4.3.5.3 Each Center shall ensure employees are aware of the Center's safety and health management program and their roles and responsibilities for ensuring safety and health.

4.3.6 Program Evaluation and Improvement

4.3.6.1 Each Center shall verify the safety and health management program is implemented to achieve its goals through monitoring the appropriate performance measures.

4.3.6.2 Each Center shall conduct an annual assessment to identify improvements and required adjustments to ensure the effectiveness of the safety and health management program and achievement of program goals.

4.3.6.3 The Center shall provide the necessary information to support the annual OSHA report. OSMA will provide the list of the necessary information to the Centers following OSHA's request to the Agency.

4.3.7 Contractor Management

4.3.7.1 Center Directors and project managers shall ensure that NASA contracts are written to appropriately incorporate the requirements of this NPR based on the hazards associated with the work being performing.

4.3.7.2 Center Directors and project managers shall ensure that contractors are required to submit a safety and health plan that defines how the Contractor will meet the safety and health requirements of the contract.

4.3.7.2.1 Safety and health plans shall be reviewed and approved by the Center SMA organization.

4.3.7.2.2 The Center SMA organizations shall ensure the appropriate Institutional Safety Discipline Leads review the safety and health plan prior to approval.

Note: The hazardous nature and complexity of the contract work should be used to determine the involvement of the SMA organization in the review of the safety and health plan prior to contract award.

4.3.7.3 Center Directors and project managers shall hold contractors accountable for the safety of their employees, their services, their products, and for complying with NASA and Center safety requirements.

4.3.8 Multiemployer Worksites

4.3.8.1 NASA Centers and facilities are multi-employer worksites (civil servants, NASA contractors, and tenants). For this reason, communication and coordination between NASA and all on-site workers are critical for maintaining safety and health.

4.3.9 Multiemployer Worksites – NASA controlled worksites

4.3.9.1 Each Center shall make all workers on the site aware of all worksite hazards whether controlled by NASA or a tenant and the methods and procedures needed to control exposures to them.

Note: In this context, worksite hazards are those hazards with the potential of impacting the workforce not directly involved in the activity or operation. Some examples of potential workplace hazards are loading a toxic propellant on a spacecraft, leak of nitrogen gas into an occupied space, and the potential exposure to asbestos while performing maintenance/ construction.

4.3.9.2 Each Center shall coordinate and exchange information with contractors and tenants about NASA controlled hazards present in the workplace and the measures implemented to prevent or control such hazards.

4.3.9.3 Each Center shall ensure contracts and agreements include any necessary provisions to ensure hazards in a non-NASA controlled worksite that can impact NASA controlled worksites are properly identified, controlled, and communicated to the workforce.

4.3.9.4 Mishaps involving NASA personnel, property, or contracted activities shall be reported and investigated in accordance with NPR 8621.1.

Note: Mishaps involving NASA property that has been leased to a second party that does not effected NASA personnel or operations can be investigated in accordance with the lease agreement provided the agreement includes a clause that the property must be returned to its original state at the end of the lease.

4.3.10 Multiemployer Worksites – Worksites not under NASA control.

4.3.10.1 Center employees who work at non-Center workplaces are covered by their Center's safety and health management program. Even when a Center does not have the authority to require abatement of hazardous conditions in a non-Center workplace, the Center Director is and remains responsible for assuring the safe and healthful working conditions for his or her employees.

4.3.10.2 Each Center Director, to assure the safe and healthful working conditions of employees at non-Center controlled facilities, shall assess the nature and extent of hazardous activities, implement administrative controls for employees, and provide protective equipment or controls as appropriate.

4.3.10.3 In the event insufficient precautions are identified at a non-NASA worksite, strategies will be developed with the host organization to reduce the risk to the NASA personnel or they may withdraw from the non-Center controlled facility.

4.3.10.4 Each Center Director shall ensure contracts and agreements facilitate and do not constrain the Center Director's ability to fulfill their responsibility for safety and health. Contracts and agreements should include any necessary provisions to ensure conformity with

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NASA's mission and with protecting the workforce. Common provisions include sharing of safety and health information, safety and health plans, audits and inspections, and mishap investigations.

Note: NASA FAR Supplement, NPR 8800.15, Real Estate Management Program, NAI 1050-1, Space Act Agreements Guide, NASA Real Estate Desktop Guide, and NASA Desk Guide for Enhanced Use Leasing of Real Property provide good guidance and background for ensuring contracts and agreements facilitate and do not constrain the Center Director's ability to fulfill their responsibility for safety and health.

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Chapter 5. Fire Protection and Life Safety

5.1 Fire Protection and Life Safety Program

5.1.1 Each Center shall document and implement a Center Fire Protection and Life Safety Program to protect human life and property from the risk of fire-related hazards. A fire protection and life safety program consists of:

- a. Fire protection and life safety engineering to prevent fire incidents and minimize the impact of those fires that do occur.
- b. Fire prevention activities to identify and mitigate fire hazards and provide fire safety awareness.
- c. Fire services to protect lives and property.

Note: Elements of the Center's fire protection and life safety program may reside in different organizations and may be funded or managed either locally at the Center or centrally by the Agency. For example, fire protection and life safety, fire prevention, and the fire services, may each be provided by different organizations. The Center Director's responsibility for safety and for the Center's fire protection and life safety program remains undiminished.

5.2 Institutional Safety Discipline Lead Designation – Authority Having Jurisdiction

5.2.1 The Center Director shall appoint in writing a qualified person as the Authority Having Jurisdiction (AHJ) who is the Institutional Safety Discipline Lead for fire protection and life safety.

5.2.2 In addition to the responsibilities in 2.6.3, the AHJ is responsible for verifying the Center conforms with this chapter.

5.3 Referenced Standards

Each Center shall provide and maintain fire protection and life safety systems and procedures at the Center and associated facilities in accordance with the NFPA 101, Life Safety Code, 2018 edition, the International Building Code (IBC), 2018 edition, and NASA-STD-8719.11, Standard for Fire Protection and Life Safety.

5.4 Fire Protection and Life Safety Unique Requirements – Reserved

5.5 Authority Having Jurisdiction Qualifications

5.5.1 The AHJ shall have the following qualifications:

- a. Leadership and managerial experience at a proven level commensurate with the expectations of the AHJ position and one of the following designations and certifications:

(1) Registered professional engineer who has passed the fire protection engineering written examination administered by the National Council of Examiners for Engineering and Surveying (NCEES) and has a minimum of eight years of work experience directly related to fire safety, building safety, life safety, and related code compliance.

(2) Registered professional engineer in a related field with a minimum of ten years documented work experience directly related to fire safety, building safety, life safety, and related code compliance.

(3) Certified Safety Professional along with certification as either an International Code Council Certified Building Official or NFPA Certified Fire Protection Specialist with ten years documented work experience directly related to fire safety, building safety, life safety, and related code compliance.

(4) Fire Service Professional meeting all requirements of NFPA 1037, Standard on Professional Qualifications for Fire Marshal, with a minimum of ten years documented work experience directly related to fire safety, building safety, life safety, and related code compliance.

b. Work experience directly related to fire safety, building safety, life safety, and related code compliance including multi-faceted experience with significant work in each of the following three major areas:

(1) Risk management, decision analysis, and communication of complex technical issues.

(2) Building construction, code enforcement, life safety and means of egress systems, fire control and suppression systems, fire detection and alarm systems, building tenability systems, building fire resistance, electrical systems, lightning protection systems, conveyance systems, and other building systems and facility infrastructure relating to fire hazards in the workplace.

(3) Hazardous materials control, manual fire response and suppression, facility loss prevention control practices, ignition source controls, inspection, testing, and maintenance of protective systems, fire investigation procedures, and related fire prevention best practices.

5.5.2 Individuals appointed as AHJ at a NASA Center prior to the effective date of this NPR are exempt from the requirements in 5.5.1 for the duration of their tenure as AHJ.

Chapter 6. Explosive, Propellant, and Pyrotechnic Safety

6.1 Explosives, Propellants, and Pyrotechnics Safety Program

Each Center shall document and implement a Center Explosives, Propellants, and Pyrotechnics Safety Program to prevent loss of life, injury, and loss of and damage to facilities and equipment. The program ensures operations are conducted in a manner that exposes the minimum number of people to the minimum quantity of explosives for the minimum period of time.

6.2 Institutional Safety Discipline Lead Designation – Explosives Safety Officer

6.2.1 The Center Director shall appoint in writing a qualified person as the Explosives Safety Officer (ESO) who is the Institutional Safety Discipline Lead for explosives, propellants, and pyrotechnics operations at their Center or Component Facility.

6.2.2 The ESO is responsible for ensuring the Center meets the requirements in this chapter in addition to the responsibilities outlined in 2.6.3.

6.3 Referenced Standards

Each Center shall provide uniform engineering and technical requirements for processes, procedures, practices, and methods for safely handling and storing explosives, propellants and pyrotechnics to protect personnel and property from the hazards of explosives and energetic materials, in accordance with NASA-STD-8719.12, Safety Standard for Explosives, Propellants, and Pyrotechnics.

6.4 Explosives, Propellants, and Pyrotechnics Unique Requirements

The ESO shall review all contracts and agreements associated with explosive, propellant, and pyrotechnic operations.

Note: If the ESO represents NASA as a tenant organization, the ESO assures compliance with the host requirements through formal negotiations and documentation of those contracts and agreements. If the ESO represents NASA as the Host, the ESO assures compliance with all appropriate elements of this NPR. In all cases, the ESO assures that contracts and agreements are formalized to maximize the health and safety of NASA employees and facilities.

6.5 Explosives Safety Officer Qualifications

6.5.1 The ESO shall have all of the following qualifications:

- a. Leadership and managerial experience at a proven level commensurate with the expectations of the ESO position.
- b. BS degree in engineering, science, or another technical discipline.

c. Ten or more years documented work experience, for government or industry, directly involved with explosives materials, pyrotechnics and/or energetic liquids.

6.5.2 The ESO should possess a thorough understanding of:

a. Explosives safety laws, policies, regulations, rules, procedures, and methods.

b. Explosives, propellants, pyrotechnics, and energetic materials.

c. The effects of explosives, the means of preventing or reducing explosive mishaps, and the relationship between quantity-distance siting criteria and personnel safety.

d. Explosives hazard classification, explosives storage principles, explosives handling protocols, explosives inventory and proper disposition practices.

e. Basic Electrostatic Discharge, Basic Electromagnetic Interference, Basic Industrial Hygiene, Chemistry of Explosives, Basic Pyrotechnics, and System Safety. This knowledge can be fulfilled by college or other courses taken throughout their career.

f. NFPA Codes and standards, related Occupational Safety and Health Administration (OSHA) and Department of Transportation (DOT) regulations, and NASA policies, requirements, and procedures associated with explosives, propellants, pyrotechnics and energetic materials.

6.5.3 Individuals appointed as ESO at a NASA Center or Component Facility prior to the effective date of this NPR are exempt from the requirements in 6.5 for the duration of their tenure as ESO.

Chapter 7. Ground-based Pressure Vessels and Pressurized Systems Safety

7.1 Ground-based Pressure Vessels and Pressurized Systems Program

Each Center shall document and implement a Center Pressure Vessels and Pressurized Systems (PVS) Program to manage risk to people and facilities posed by ground-based PVS in accordance with NASA STD 8719.17.

Note: See section 12.5 of this document for requirements pertaining to PVS in space and aeronautical flight programs and projects.

7.2 Institutional Safety Discipline Lead Designation – Pressure Systems

7.2.1 Each Center Director shall appoint in writing a qualified person as the Pressure Systems Manager (PSM) who is the Institutional Safety Discipline Lead for PVS.

7.2.2 In addition to the responsibilities outlined in 2.6.3, the PSM is responsible for verifying the Center conforms with this chapter, Federal regulations and state and local PVS regulations when not operating under exclusive federal jurisdiction.

7.3 Referenced Standards

Each Center shall design, acquire, operate, repair, and maintain all ground-based PVS in accordance with NASA-STD-8719.17, NASA Requirements for Ground-Based Pressure Vessels and Pressurized Systems (PVS).

7.4 Pressure Vessels and Pressurized Systems Unique Requirements

7.4.1 Center Directors shall direct application of NASA-STD-8719.17 to non-NASA-owned PVS that pose risks to NASA personnel, facilities, equipment, or property through contract provisions or other means (agreements, memoranda of agreement, joint use agreements) based on guidance from the PSM.

7.4.2 The PSM shall ensure Center compliance with applicable PVS regulations and with NASA-STD-8719.17 by:

- a. Verifying that Center-specific procedures are developed and implemented for PVS design, acquisition, fabrication, inspection, testing, installation, repair, alteration, operation, maintenance, certification, and documentation of noncompliance.
- b. Reviewing and approving design and procurement specifications for compliance.
- c. Specifying voluntary consensus standards that apply to ground-based PVS consistent with the requirements of NASA-STD-8719.17 and interpret voluntary consensus standard application(s) to the Center.

- d. Advising the Contracting Officer and Center Director on the application of this NPR and NASA-STD-8719.17 to contractor or tenant operations, if a non-NASA-owned PVS operated on NASA property poses risk to NASA personnel, facilities, or equipment.
- e. Reviewing for equivalency and acceptance of non-NASA PVS safety programs with the potential to impact NASA operations or workforce.
- f. Identifying, reviewing, and evaluating specific PVS or categories of PVS that may be excluded from Center PVS programs on the basis of negligible operational risk or hazard to personnel under any foreseeable failure, and documenting the rationale for the exclusion in the PVS configuration management system.
- g. Verifying that periodic inspection and recertification is performed for all ground-based PVS to assure their ongoing fitness for service and to document and assess relevant changes in condition or knowledge that materially affect risk assessment.
- h. Documenting and maintaining the certification status of PVS in the configuration management system, including indication of all exceptions, waivers, nonconformances, special constraints, or instructions required for safe operation of the PVS.
- i. Ensuring all non-excluded PVS are evaluated and either certified or covered by approved waiver prior to operation.

7.4.3 Organizations involved with Ground-based PVS shall:

- a. Design, acquire, fabricate, inspect, test, install, repair, alter, operate, and maintain all PVS items in accordance with NASA-STD-8719.17, and design specifications.
- b. Develop and implement operation, inspection, and maintenance procedures to comply with the operational limits of the PVS.
- c. Ensure that all PVS are certified prior to operation or covered by approved waiver prior to operation.
- d. Ensure that all existing uncertified PVS are assessed and documented as sufficiently safe to operate by the PSM.
- e. Employ personnel trained, qualified, and certified to operate a specific PVS.
- f. Submit designs or procurement specifications for new PVS or modifications to existing PVS for review and approval by the PSM or designee prior to initiating the procurement action or the modification.
- g. Control the configuration of PVS, including the engineering and maintenance changes made to PVS, through the use of a configuration management system.

7.5 Pressure Systems Manager Qualifications

7.5.1 The following represent the recommended minimum attributes for this position:

7.5.1.1 Education and experience (or demonstrated equivalent):

- a. BS degree in an appropriate engineering field (e.g., mechanical, civil, structural, or aerospace engineering),
- b. Ten years of combined experience in the design, operation, maintenance, or repair of pressure vessels or pressure piping systems, and
- c. Five years of experience managing projects.

7.5.1.2 Knowledge requirements:

a. Thorough understanding of:

- (1) ASME stress analysis, including pressure, external, thermal, dynamic loadings, etc.,
 - (2) Statics and dynamics,
 - (3) Fracture Mechanics,
 - (4) PVS fabrication, welding, inspection, etc. techniques and processes, and
 - (5) PVS failure modes and damage mechanisms, and the NDE techniques and analyses that are used to identify precursors to those failure modes and to determine acceptable limits on operations to avoid them.
- b. Knowledge of ASME and other PVS Codes and standards, related Occupational Safety and Health Administration (OSHA) and Department of Transportation (DOT) regulations, and NASA policies, requirements, and procedures associated with PVS.

7.5.1.3 Ability to:

- a. Advise the Center Director, the Contracting Officer, and other management and project management personnel on PVS issues, including budgets, procurements, certification and training requirements, operations, disposition of requests for relief from requirements, etc.
- b. Represent the Center on the Agency-wide Pressure Systems Managers Working Group and to the Headquarters Office of Safety and Mission Assurance.
- c. Develop and maintain Center PVS policies.
- d. Plan and manage the Center PVS program, including developing budgets, schedules, a certification program, and work plans in order to manage risk associated with Center pressure systems.

- e. Function as Center Institutional Safety Discipline Lead for PVS, including decisions regarding systems safety.
- f. Work effectively with other high-level Center technical and management personnel.
- g. Communicate effectively, both verbally and in writing, in technical and project management scenarios.
- h. Develop, review and assess PVS designs, drawings, and procurement specifications and statements of work for clarity, accuracy, and compliance with applicable requirements.
- i. Assess and document PVS for adequate design and quality for the intended function, and ensure their fitness for service and safety for continued operation in accordance with the requirements of NASA-STD-8719.17.
- j. Access PVS in the field for inspection and assessment as needed.
- k. Incorporate results of field inspections and assessments of service-related degradation and accumulated cyclic fatigue and fracture damage into PVS certification decisions.
- l. Fulfill all of the roles and responsibilities delineated in this NPR for the PSM.

7.5.1.4 Be conversant with the Federal procurement process, NASA and Center standards, directives, and processes, and hazard analysis processes.

Chapter 8. Lifting Devices and Equipment Safety

8.1 Lifting Devices and Equipment Program

Each Center shall document and implement a Center Lifting Devices and Equipment (LDE) program to prevent loss of life, injury, and loss of and damage to facilities and equipment by enhancing safety and reliability and ensuring compliance with regulatory requirements.

8.2 Institutional Safety Discipline Lead Designation – Lifting Devices and Equipment Manager

8.2.1 Each Center Director shall appoint in writing a qualified person as the Lifting Devices and Equipment Manager (LDEM) who is the Institutional Safety Discipline Lead for lifting devices and equipment.

8.2.2 The LDEM is responsible for ensuring the Center meets the requirements in 8.3 and 8.4 in addition to the responsibilities outlined in 2.6.3.

8.3 Referenced Standards

8.3.1 Center Directors and project managers shall acquire, operate, and maintain lifting devices and equipment (LDE) designed, constructed, tested, and inspected in accordance with NASA-STD-8719.9, Lifting Standard.

8.3.2 Center Directors and project managers shall utilize personnel licensed in accordance with NASA-STD-8719.9 to operate LDE.

8.4 Lifting Devices and Equipment Unique Requirements

8.4.1 Each Center shall establish a Center Lifting Devices and Equipment Committee (LDEC) to serve as a forum for the exchange of LDE information and issue resolution and to review Center-level LDE safety policy and requirements.

8.4.2 The Center LDEC shall consist of the Center LDEM as the chair and representatives of the Center organizations responsible for LDE.

8.4.3 The NASA LDEC, established by the Office of Safety and Mission Assurance, serves as a forum for the exchange of LDE information and issue resolution, and to review proposed changes to this standard. The NASA LDEC membership consists of: the Chair, designated by the Chief, SMA; and the LDEM from each Center.

8.5 Lifting Devices and Equipment Manager Qualifications

8.5.1 The following represent the recommended minimum attributes for this position:

8.5.1.1 Education and experience:

- a. A bachelor's degree in engineering from an accredited college or university and a minimum of 2 years of cumulative experience with lifting devices and equipment design, specification development, procurement, maintenance, inspection, and operations or
- b. An associate's or bachelor's degree in engineering technology from an accredited college or university and a minimum of 5 years of cumulative experience with lifting devices and equipment design, specification development, procurement, maintenance, inspection, and operations.

8.5.1.2 Knowledge requirements:

a. Thorough understanding of:

- (1) Stress analysis, including static and dynamic analysis as encountered in mechanical systems,
 - (1) Statics and dynamics,
 - (2) Fracture Mechanics,
 - (3) Techniques and processes for LDE Fabrication, welding, inspection, etc., as related to LDE construction and repair,
 - (4) LDE failure modes and damage mechanisms, and the NDE techniques and analyses that are used to identify precursors to those failure modes and to determine acceptable limits on operations to avoid them, and
 - (5) Wire rope load capabilities, use, maintenance, wear, and failure mechanisms.
- b. Knowledge of ASME and other LDE VCS, related Occupational Safety and Health Administration (OSHA) regulations, and NASA policies, requirements, and procedures associated with LDE.

8.5.1.3 Ability to:

- a. Develop and review and assess LDE designs, drawings, and procurements specifications and statements of work for clarity, accuracy, and compliance with applicable requirements.
- b. Assess and document LDE for adequate design and quality for the intended function and ensure their fitness for service and safety for continued operation in accordance with the requirements of NASA-STD-8719.9 and associated VCS and applicable regulations.
- c. Advise Center management, the Contracting Officer, and other management and project management personnel on LDE issues, including budgets, procurements, certification and training requirements, operations, disposition of requests for relief from requirements, etc.
- d. Represent the Center on the Agency-wide Lifting Devices and Equipment Committee (LDEC) and to the Headquarters Office of Safety and Mission Assurance, and chair the Center LDEC.

- e. Develop and maintain Center LDE policies.
- f. Plan and manage the Center LDE program, including developing budgets, schedules, and work plans to minimize risk associated with Center LDE operations as Center Institutional Safety Discipline Lead for LDE.
- g. Work effectively with all levels of Center technical, management, and operations personnel to ensure safe LDE operations through understanding and implementation of LDE requirements, including the following:
 - (1) NASA and Center Standards, Directives, and Processes,
 - (2) Voluntary consensus standards, and
 - (3) OSHA regulations and other applicable regulatory requirements.
- h. Communicate effectively both verbally and in writing in technical and project management scenarios.
- i. Develop, review, and approve clear, complete, and accurate specifications and statements of work for LDE procurements or modifications.
- j. Physically access cranes and other LDE in the field for inspection and assessment.
- k. Assess and document compliance of new and existing LDE, LDE training, and LDE operators with NASA-STD-8719.9, and applicable OSHA regulations and VCS.
- l. Be conversant with the Federal procurement process, NASA and Center standards, directives, and processes, and hazard analysis processes within six months of hire date.

Chapter 9. Fall Protection

9.1 Fall Protection Program

Each Center shall implement a Center fall protection program to protect any persons who work at heights at NASA managed facilities.

9.2 Institutional Safety Discipline Lead Designation – Fall Protection Program Administrator

9.2.1 Each Center Director shall appoint in writing a qualified person as the Fall Protection Program Administrator who is the Institutional Safety Discipline Lead for fall protection.

9.2.2 The Fall Protection Program Administrator is responsible for ensuring the Center meets the requirements in 9.3 and 9.4 in addition to the responsibilities outlined in 2.6.3.

9.3 Referenced Standards

9.3.1 Each Center shall implement and manage a fall protection program in accordance with ANSI/ASSP Z359.2-2017, Minimum Requirements for a Comprehensive Managed Fall Protection Program..

9.3.2 The Fall Protection Program Administrator may develop alternative requirements to those in ANSI/ASSP Z359.2-2017 if they determine a requirement in ANSI/ASSP Z359.2-2017 is not feasible, they maintain documentation explaining the infeasibility of the requirement, and they demonstrate the alternative provides an equivalent level of protection.

9.3.3 The Fall Protection Program Administrator may exempt temporary construction contractors from the requirements of this chapter if the temporary construction contractor's fall protection program meets the requirements of 29 CFR 1926.

9.4 Fall Protection Unique Requirements – Reserved

9.5 Fall Protection Program Administrator Qualifications

The FPPA shall be trained to the Competent Person level as defined in ANSI/ASSP Z359.2-2017.

Chapter 10. Aviation Safety

10.1 Aviation Safety Program

10.1.1 NASA maintains an Aviation Safety Program to ensure the safety of its highly diversified aviation activities. The NASA Aviation Safety Program has the following primary objectives:

- a. Preserving human and material resources by preventing damage and injury through the identification and elimination of aviation safety hazards throughout NASA.
- b. Enhancing awareness of aviation safety objectives and related considerations by relevant NASA civil servants and contractor personnel.

10.1.2 This chapter assigns key responsibilities related to the Aviation Safety Program. Additional responsibilities and related requirements are contained in NPR 7900.3.

10.2 Aviation Safety Program Responsibilities

10.2.1 The Chief, SMA delegates responsibilities for the implementation of NASA's Aviation Safety Program to the Director, Aircraft Management Division (AMD). Accordingly, the Director, AMD:

- a. Defines Agency aviation safety responsibilities and requirements covering NASA's aircraft operations for Centers, programs, and projects.
- b. Performs functional oversight and assessments to assure the implementation of the responsibilities and requirements by Centers, programs, and projects.
- c. Informs the Chief, SMA of aviation safety concerns and may halt aviation operations.
- d. Adjudicates requests for waivers to the Agency-level aviation safety requirements in NPR 7900.3 or otherwise established by AMD.

Note: Waiver decisions may be subject to requirements for the acceptance of risks to safety and mission success in NPR 8000.4.

- e. Periodically informs the Chief, SMA of the state of the Aviation Safety Program.
- f. Will remain independent from aircraft operations and maintain the necessary technical expertise.

10.2.2 The Chief, SMA assigns a delegate within OSMA to provide oversight to the Aviation Safety Program by participating in or reviewing program activities, such as;

- a. The Inter-Center Aircraft Operations Panel (IAOP) Reviews managed by the AMD.
- b. The HQ bi-yearly IAOP Chief's Meetings led by AMD.
- c. The Aircraft Advisory Committee led by the AMD.

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10.2.3 Center Directors are responsible for the safety of all aircraft, including UASs, and crews assigned to or operating from their Centers. As part of this responsibility, Center Directors implement Center-level aviation safety programs in accordance with NPR 7900.3.

10.2.4 Consistent with NPD 1000.0, program and project managers are responsible and accountable for the safe conduct of aviation activities under their cognizance in conformance with governing requirements.

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Chapter 11. Radiation Safety

This chapter references two areas (ionizing and non-ionizing radiation) to be part of the Centers overall safety and health program, however, the requirements for these are documented in NPR 1800.1.

11.1 Non-Ionizing Radiation

NASA roles, responsibilities, and procedural requirements for protecting the public and workforce from risks associated with the use of sources of non-ionizing radiation (including laser and non-laser optical radiation, and radio frequency electromagnetic radiation) are documented in NPR 1800.1. These roles include the Chief Health and Medical Officer (CHMO) and the Laser Safety Officer (LSO).

11.2 Ionizing Radiation

NASA roles, responsibilities, and procedural requirements for protecting the public and workforce from risks associated with the handling, use, and storage of radioactive material and radiation generating equipment are documented in NPR 1800.1. These roles include the CHMO and the Radiation Safety Officer (RSO).

Chapter 12. Mission Collateral Safety Risk

12.1 Overview

Missions expose the public, the workforce, and Earth, space, and planetary environments to risk associated with conducting the missions. This chapter addresses functional areas directly tied to missions. These are range flight safety, payload safety, nuclear flight safety, and flight pressure vessels.

12.2 Range Flight Safety

NASA roles, responsibilities, and procedural requirements for protecting the public, workforce, and property during range operations associated with flight are documented in NPR 8715.5, Range Flight Safety Program. These roles include the Center Range Flight Safety Lead.

12.3 Payload Safety

NASA roles, responsibilities, and procedural requirements for protecting the public, workforce, and property during payload ground operations associated with processing and testing, vehicle integration, flight, and planned return-to-Earth recovery and sample return are documented in NPR 8715.7, Payload Safety Program. These roles include the NASA Payload Safety Manager.

12.4 Nuclear Flight Safety

NASA roles, responsibilities, and procedural requirements for protecting the workforce, public, and the environment from risks associated with a planned launch of radioactive materials into space, on launch vehicles and spacecraft are documented in NPR 8715.3, NASA General Safety Program Requirements. These roles include the Chief, SMA and the Nuclear Flight Safety Assurance Manager.

12.5 Flight Pressure Vessels and Pressurized Systems Safety

12.5.1 Managers of space and atmospheric programs and projects shall designate an individual to establish and manage a qualification and acceptance or recertification process to ensure safe and reliable testing and use of space and atmospheric-flight PVS.

12.5.2 Centers and Mission Directorates shall qualify and accept spaceflight PVS, including qualification units, in accordance with ANSI/AIAA S-080A-2018, Space Systems—Metallic Pressure Vessels, Pressurized Structures, and Pressure Components, and ANSI/AIAA S-081B-2018, Space Systems—Composite Overwrapped Pressure Vessels (COPV).

12.5.3 All handling of COPVs shall be in accordance with their damage control plan.

12.5.4 Centers and Mission Directorates shall qualify and accept atmospheric flight (non-spaceflight) PVS in accordance with the Federal Aviation Administration, in Hazardous Materials Regulation, 49 CFR subch. C. Aircraft PVS on NASA operated aircraft, owned by other agencies such as the Department of Defense, will be maintained, operated, and modified in accordance with approved technical orders from the agency owning the aircraft.

Chapter 13. Operational Safety Specific Program Requirements

13.1 Overview

13.1.1 This chapter addresses additional functional areas that should be part of the Centers overall safety and health program.

13.1.2 Unless explicitly delegated elsewhere by the Center, the Safety Manager shall serve as the Institutional Safety Discipline Lead for the following functional areas, with the exception of Motor Vehicle Safety.

13.2 Motor Vehicle Safety

13.2.1 Operators of motor vehicles on NASA property or a NASA vehicle both on and off NASA property shall:

- a. Not drive a motor vehicle for a continuous period of more than 10 hours, including a combination of personal driving and driving for official NASA business.
- b. Not drive a motor vehicle for a combined duty period that exceeds 12 hours in any 24-hour period, without at least 8 consecutive hours of rest.
- c. Not use hand-held communication devices while the vehicle is in motion except for emergency, security, and fire vehicles during official operations.

Note: This includes cell phones, UHF radios, or other hand-held wireless communication devices. When there are two individuals traveling in an emergency, security, or fire vehicle during official operations, the passenger should be the person to use the hand-held communication device.

13.3 Personal Protective Equipment

13.3.1 Requirements for use, training, maintenance, and accountability of personal protective equipment (PPE) are provided in Personal Protective Equipment, 29 CFR pt. 1910, subpt. I.

13.3.2 PPE shall be issued to NASA employees at Government expense in those situations where engineering controls, management controls, or other corrective actions have not reduced the hazard to an acceptable level or where use of engineering controls, management controls, or other techniques is not feasible.

13.3.3 Only clothing and equipment meeting Federal regulations, industrial standards, or NASA requirements for design, manufacturing and testing shall be used for PPE (e.g., eye protection meets ANSI/ISEA Z87.1:2020 – American National Standard for Occupational and Educational Personal Eye and Face Protection Devices)

13.4 Control of Hazardous Energy (Lockout / Tagout Program)

Requirements for controlling hazardous energy, either released or stored, from the potential energization of equipment or machines during service or maintenance activities are given in The Control of Hazardous Energy, 29 CFR 1910.147.

13.5 Confined Space

13.5.1 Requirements for confined space entries involving general industry operations and maintenance are governed by Permit-Required Confined Spaces, 29 CFR § 1910.146.

13.5.2 Requirements for confined space entries involving construction activities are governed by 29 CFR pt. 1926, subpt. AA (1926.1200- 1926.1213), Safety and Health Regulations for Construction.

13.5.3 Requirements for confined space entries involving telecommunications activities are governed by 29 CFR § 1910.268, Telecommunications.

13.5.4 Further guidance and information for permit-required confined spaces is provided in OSHA Instruction CPL 02-00-100, Application of the Permit-Required Confined Spaces (PRCS) Standard, 29 CFR § 1910.146.

13.6 Electrical Safety

13.6.1 Centers shall design, build, operate and maintain electrical systems in accordance to: 1) NASA and Center Standards, Directives, and Processes, (2) OSHA regulations and other applicable regulatory requirements and (3) the national consensus standards - NFPA 70, National Electric Code (2017 edition) and the IEEE National Electrical Safety Code (2017 edition).

13.6.2 Centers shall document and implement a Center Electrical Safety Program to prevent loss of life, injury, and loss of and damage to facilities and equipment in accordance to: (1) NASA and Center Standards, Directives, and Processes, (2) OSHA regulations and other regulatory requirements and (3) the national consensus standard – NFPA 70E, Standard for Electrical Safety in the Workplace (2018 edition).

13.6.3 Centers shall ensure organizations document the qualifications of their electrical workers performing electrical work greater than 50 volts after each employee has completed required training per NFPA 70E and has demonstrated proficiency in the electrical work practices involved with the tasks assigned.

13.6.4 Centers shall ensure organizations performing electrical work at NASA centers audit their electrical safety program periodically, but at least every 3 years in accordance with NFPA 70E.

13.6.5 The requirements for electrical safety are given in:

- a. 29 CFR § 1910.269, Electric power generation, transmission, and distribution.
- b. 29 CFR §§ 1910.301-399, subpt. S, Electrical.

c. 29 CFR §§ 1926.400-449, subpt. K, Electrical.

d. 29 CFR §§ 1926.950-960, subpt. V, Electric Power Transmission and Distribution.

13.6.6 In addition to the above CFR sections, Centers shall build, design, and operate electrical systems in accordance with:

a. NFPA 70, National Electric Code, 2017 edition.

b. NFPA 70E, Standard for Electrical Safety in the Workplace 2018 edition.

c. The IEEE National Electrical Safety Code, 2017 edition.

13.7 Hazardous Material Transportation, Storage, and Use

13.7.1 Transport of hazardous materials on both Federal property and public roadways shall be in accordance with 49 CFR subch. C, and State and local laws and regulations.

13.7.2 Hazardous material shall be used and stored in accordance with 29 CFR 1910 Subpart H, Hazardous Material.

13.7.3 Environment health program requirements are defined in NPR 1800.1. The purpose of these programs is to protect people from hazardous chemicals and materials, nanomaterials, and biohazards.

Note: Samples returned from space are considered hazardous material.

13.7.4 Requirements for Center hazard communications plans are provided in Hazard Communication, 29 CFR § 1910.1200. This standard enables employees to obtain information concerning the classified hazards of any hazardous material during transport, storage, and prior to use.

13.7.5 Each Center shall ensure facilities and laboratories where hazardous materials are used or stored include:

a. Proper ventilation, to control a potential hazardous exposure, designed according to requirements found in the American Conference of Governmental Hygienists (ACGIH) Industrial Ventilation: A Manual of Recommended Practice for Design, 28th Edition, 2016 and the applicable ANSI/ASSP Z9 Ventilation Systems Code:

(1) ANSI/ASSP Z9.1-2016, Ventilation and Control of Airborne Contaminants During Open-Surface Tank Operations.

(2) ANSI/ASSP Z9.2-2018, Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems.

(3) ANSI/ASSP Z9.3-2017, Spray Finishing Operations: Safety Code for Design, Construction and Ventilation.

(4) ANSI/ASSP Z9.4-2011, Abrasive-Blasting Operations – Ventilation and Safe Practices for Fixed Location Enclosures.

(5) ANSI/ASSP Z9.5-2012, Laboratory Ventilation.

(6) ANSI/ASSP Z9.6-2018, Exhaust Systems for Grinding, Polishing and Buffing.

(7) ANSI/ASSP Z9.7-2007, Recirculation of Air from Industrial Process Exhaust Systems.

(8) ANSI/ASSP Z9.9-2010, Portable Ventilation Systems.

(9) ANSI/ASSP Z9.10-2017, Fundamentals Governing the Design and Operation of Dilution Ventilation Systems in Industrial Occupancies.

(10) ANSI/ASSP Z9.11-2016, Laboratory Decommissioning.

(11) ANSI/ASSP Z9.14-2014, Testing and Performance-Verification Methodologies for Ventilation Systems for Biosafety Level 3 (BSL-3) and Animal Biosafety Level 3 (ABSL-3) Facilities.

b. Eyewashes and safety showers that meet the requirements of ANSI/ISEA Z358.1-2014, 2014, American National Standard for Emergency Eyewash and Shower Equipment.

c. Considerations to protect personnel and the terrestrial environment against potential biological or toxic hazards due to samples returned from space and protect the samples against terrestrial contamination.

Note: Special facilities should be considered to ensure the integrity of the terrestrial environment as well as the integrity of biological and physical samples returned from space.

d. Additional considerations for biohazards resulting from use or handling of biological materials such as infectious microorganisms, viruses, medical waste, or genetically engineered organisms.

Note: See Bloodborne Pathogens, 29 CFR § 1910.1030 & NPR 1800.1 sections for bloodborne pathogens and biosafety, for additional details.

13.8 Test / Operations Safety

Note 1: Test/operations safety often involves common industry hazards and unique hazardous phenomena associated with NASA activities. Tests often involve multiple and/or coincident hazardous operation, which should be assessed and coordinated in terms of interactive preparation, operational sequences and associated responses.

Note 2: Operations involving only common industry hazards (e.g., lock-out/tag-out and working on or near exposed energized parts) with a high potential to result in loss of life, serious injury or illness to personnel, or substantial damage to systems, equipment, or facilities are only required to meet the requirements of 13.8.3.

13.8.1 This section provides requirements for NASA unique and/or complex tests and operations that have a high potential to cause loss of life, serious injury or illness to personnel, or substantial damage to systems, equipment, or facilities (e.g., high-risk training activities, research facility operations, and demonstrations of test hardware or procedures).

13.8.2 Test/Operational Design, Planning, and Readiness

13.8.2.1 Center Directors and project managers shall ensure that tests/operations are designed, analyzed and planned to identify and develop adequate safety controls to assure performance within safe operating limits. During design and planning the following should be considered:

- a. Designing facility/test systems such that a credible single-point failure (e.g., power loss) cannot result in serious injury, illness, or substantial damage to equipment, property, or test hardware.
- b. Providing automated controls where timely response is necessary to reduce risk of serious injury or substantial damage and manual overrides of critical software commands to support safe test termination and egress of personnel.
- c. Ensuring timely and unencumbered rescue of personnel involved in the activities (e.g., astronaut crew and pre-test inspection team)
- d. Assessing the adequacy of hazard controls to safeguard against injury, illness, or damage to equipment, property, or test hardware.
- e. Monitoring hazardous conditions and establishing criteria for alerting personnel of potentially hazardous exposures and/or curtailing/halting test operations to preclude unacceptable consequences.
- f. Assessing the interactions with adjacent facilities, operations, or personnel and the adequacy of access controls and communications associated with the activities.
- g. Coordinating potential test article damage or loss with the test article owner or controlling program authority and what constitutes an acceptable failure documented in accordance with NPR 8621.1.

13.8.2.2 Center Directors and project managers shall conduct Test/Operational Readiness Reviews for tests involving new or modified hardware or procedures and determine and document the safety, technical, and operational readiness of the test.

13.8.2.3 Center Directors and project managers shall conduct a pre-test meeting with all involved personnel that considers the following:

- a. Review of test constraints to ensure facility and personnel safety and criteria for curtailing/halting test operations to preclude unacceptable consequences.
- b. Determination of facility, test article, ground support equipment and procedural readiness.

- c. Communication of potential hazards, safety procedures, and protective measure to personnel.
- d. Availability and readiness of emergency response resources (e.g., medical) and facilities needed for response.
- e. Qualifications and training of personnel conducting and participating in the activities and their availability to support.

13.8.3 Hazardous Operational Procedures (HOP)

13.8.3.1 Center Directors and project managers shall ensure tests / operations with a high potential to cause loss of life, serious injury or illness to personnel, or substantial damage to systems, equipment, or facilities have documented procedures that contain:

- a. A detailed plan listing step-by-step actions or tasks to be performed to ensure safe operations.
- b. Notes and warnings to identify special precautions necessary to protect personnel and equipment.
- c. List identifying employees responsible for review and approval of the Hazardous Operational Procedures (HOPs).
- d. Contingency plans identifying any special steps to take in an emergency situations.
- e. Certifications and training requirements for personnel conducting the operation.
- f. Conspicuous markings, such as "THIS DOCUMENT CONTAINS HAZARDOUS OPERATIONS PROCEDURES," to alert operators that strict adherence to the procedural steps and safety and health precautions contained therein is required to ensure the safety and health of personnel and equipment.

13.8.3.2 Center Directors and project managers shall ensure new HOPs and changes to existing ones are approved by the responsible authorities (Lead Institutional Safety Discipline Lead, safety office representatives, etc.) according to Center developed policies or procedures.

13.8.3.3 Center Directors and project managers shall ensure HOPs are conducted by trained and certified personnel when safety depends on adherence to specific standards, guidelines, and training (e.g., rigging and high voltage).

13.8.3.4 Center Directors and project managers shall ensure that where the risk of injury to employees performing a task is high, the buddy system is implemented (e.g., an adjacent or nearby person not directly exposed to the hazard serves as an observer to provide rapid assistance in the event of an emergency).

13.9 Human and Animal Research / Tests

13.9.1 In addition to the safety and health requirements in this NPR and NPR 1800.1, research or tests involving human or animal subjects, and facilities used for such, are subject to inspections per:

- a. 14 CFR pt. 1230, Protection of Human Subjects,
- b. 45 CFR pt. 46, Protection of Human Subjects.
- c. The Guide for the Care and Use of Laboratory Animals (The Guide), Eighth Edition, 2011, National Academy Press, Washington D.C., and
- d. NPD 7100.8, Protection of Human Research Subjects.

13.10 Underwater Operations Safety

13.10.1 The requirements below apply to all NASA underwater operations, including support operations, where members of the workforce are required to work or train in water using an underwater apparatus (including snorkels) that supplies breathing air or gas. It applies to all diving, snorkeling, and training operations.

13.10.2 Project managers shall notify the Center SMA organization and the Center diving control (safety) board before performing diving and snorkeling activities.

13.10.3 Centers that conduct diving and snorkeling operations shall implement a diving safety program that contains the following elements:

- a. A diving safety manual (safe practices manual) which includes:
 - (1) Procedures covering all diving and snorkeling operations specific to the program.
 - (2) Procedures for emergency care, including recompression and evacuation.
 - (3) Criteria for diver training and certification.
 - (4) Criteria for facility and equipment certifications, use and maintenance procedures, and inspection.
- b. A diving control (safety) board that:
 - (1) Approves and monitors diving and snorkeling activities.
 - (2) Revises the diving safety manual.
 - (3) Assures compliance with the diving safety manual.
 - (4) Certifies divers for specific underwater activities.

Note: If a NASA Center without a diving safety program conducts diving or snorkeling operations through another NASA Center or government Agency, such as the Navy, the other NASA Center's or government Agency's diving safety program requirements apply.

13.10.4 The following are useful references when developing underwater safety standards and safety program:

- a. Commercial Diving Operations, 29 CFR 1910 subpt. T contains regulatory requirements for diving and related support operations conducted in connection with all types of work and employments, including general industry, construction, ship repairing, shipbuilding, shipbreaking, and longshoring. While it is not applicable to scientific diving, it does define two required elements of a scientific diving program: (A) a diving safety manual, and (B) a diving control safety board. Appendix B to Subpart T to Part 1910 contains guidelines for scientific diving.
- b. Basic Health and Human Services Policy for Protection of Human Research Subjects, 45 CFR pt. 46 subpt. A, contains regulatory requirements that may be applicable to divers participating in research.
- c. Commercial Diving Operations, 46 CFR pt. 197 subpt. B contains regulatory requirements for the design, construction, and use of equipment, and inspection, operation, and safety and health standards for commercial diving operations taking place from vessels and facilities under Coast Guard jurisdiction.
- d. NPR 1800.1, Appendix C, provides requirements for diver physical examinations.
- e. JPR 8715.2, JSC Safety Standard for Underwater Operations
- f. SS521-AG-PRO-010 U.S. Navy Diving Manual, has served as the internationally recognized standard, since the late 1950's, for allowable exposure while breathing compressed air at varying depths, and prescribes decompression schedules for dive profiles that exceed allowable exposure limits. It includes volumes on: Diving Principles and Policies, Air Diving Operations, Mixed-Gas Surface-Supplied Diving Operations, Closed-Circuit and Semiclosed-Circuit Diving Operations, Diving Medicine and Recompression Chamber Operations.
- g. EM 385-1-1, Safety and Health Requirements Manual, 2014 published by the U.S. Army Corps of Engineers, provides in section 30, Diving Operations, requirements for USACE diving operations. Section 30.G, Scientific Snorkeling, provides requirements for scientific snorkeling activities.
- h. FSH 4209.11, Wildlife, Fish, Water, and Air Research Handbook, Chapter 10 "Diving and Snorkeling Safe Practices" by the US Forest Service establishes direction for diving and snorkeling safe practices."
- i. The Standards for Scientific Diving Manual, developed by the American Academy of Underwater Sciences, is a consensus standard for scientific diving and presents minimum safety standards for scientific diving.

Chapter 14. Facility Safety Management

14.1 Purpose

14.1.1 The purpose of this chapter is to assure facility safety throughout the entire facility life cycle. Facility life cycle phases include requirements development, planning, design, construction, activation, operation, and disposal. The goal is to manage risks associated with each of these life cycle phases. Facility safety is integrated with functional project objectives to ensure that appropriate resources are allocated for safe facility management over its entire life cycle.

14.1.2 This chapter establishes requirements for the safety and mission success of NASA facilities throughout their life cycle, consistent with the requirements of the NASA Facilities and Real Estate Division (including NPD 8820.2, NPR 8820.2, and NPR 8831.2).

14.1.3 Safety tasks (e.g. hazards analysis, pre-operations / construction safety meetings, safety surveillance) during each life-cycle phase need to be appropriate for the size and complexity of the project, the nature of operations active in the facility, and the associated risks.

14.1.4 Unless explicitly delegated elsewhere by the Center, the Safety Manager shall serve as the Institutional Safety Discipline Lead for facility safety.

14.2 Facility Safety Management Program

Centers shall establish a Center facility safety management program to ensure safety of the workforce and the public and mission assurance using risk-informed decision tools.

Note: For additional information on tools and techniques applicable to facility safety management, see NASA-STD-8719.7, Facilities System Safety Guidebook.

14.3 Organization and Personnel Designation – Facility Safety Management Program

14.3.1 Each Center shall designate an organization responsible for facility safety management independent from the facility management organization.

14.3.2 Each Center shall identify an individual for each facility to manage the safe operation of the facility, document the authority delegated to these individuals, and provide safety support based on risk to personnel and property.

Note: This role may be a full-time or collateral duty as determined by Center management.

14.4 Facility Safety Requirements

14.4.1 Each Center shall ensure new facilities, facilities undergoing rehabilitations, or changes in use or occupancy of a facility, meet applicable national consensus codes in effect at the time of the project.

Note: Types of rehabilitations and their requirements, as well as requirements for changes in use or occupancy, are defined in Chapter 43 of NFPA 101. The design review process should be modeled after the guidelines in NASA-STD-8719.7, Facility System Safety Guidebook, as appropriate for the type of project.

14.4.2 Each Center shall identify, track, and control hazardous conditions to reduce risk to personnel and property. The methods employed to identify, track and control hazardous conditions need to:

- a. consider all hazards within the facility and take an integrated approach with other facilities, operations, and subsystems and
- b. apply system safety engineering and management principles and techniques appropriate for the hazards present and facility complexity throughout all phases of the facility's life-cycle.

Note: Early hazard identification and resolution provide the greatest opportunity to minimize the cost and need for a retrofit program.

14.4.3 Each Center shall provide qualified personnel to review all proposed NASA-owned, controlled, or operated facility configuration changes and construction work change orders that have a potential to impact fire protection, safety, or health.

Note: This does not preclude the use of checklists and other guidelines to assist the project in determining the potential impact to fire protection, safety, or health and necessary risk management requirements.

14.4.4 Each Center shall include a safety representative in inspections and reviews throughout the facility life cycle (i.e., requirements development, planning, design, construction, activation, operation, and disposal).

Note: Including safety from the start of the project, whether it's a new building or demolition of an existing, enables determination of applicable consensus codes and standards and NASA requirements to minimize the risk that safety and health requirements are not incorporated from the start of the project.

14.4.5 Each Center shall include a health representative in inspection and review efforts throughout the facility life cycle when the facility has potential health hazards that require controls to be implemented prior to or during construction and facility activation (e.g., new office space requiring appropriate ergonomic furniture, hazardous gas vent system, and removal of asbestos during renovation).

14.4.6 Centers shall ensure compliance with NASA-STD 8719.11 and applicable national consensus codes and shall correct nonconformances identified during plan review and/or inspection. A Certificate of Occupancy from the Authority Having Jurisdiction (AHJ) is required prior to occupancy.

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14.4.7 Construction safety requirements are found in 29 CFR 1926, Safety and Health Regulations for Construction. Centers may choose to adopt additional standards such as EM 385-1-1.

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Appendix A. Definitions

Approving Authority. The person or organization responsible for oversight of the requirement and authorized to grant relief from the requirement.

Designated Agency Safety and Health Official (DASHO). The individual who is responsible for the management of the safety and health program within an agency, and is so designated or appointed by the head of the agency pursuant to § 1960.6 and the provisions of Executive Order 12196. [source 29 CFR pt. 1960]

Deviation. A documented authorization releasing a program or project from meeting a requirement before the requirement is put under configuration control at the level the requirement will be implemented. [source NPR 7120.5]

Enhanced-use Lease. An out-grant agreement with a public or private entity for the use of NASA-owned real property that allows NASA to retain the cash or in-kind proceeds from the agreement. [source NPR 8800.15]

Hazard. A state or a set of conditions, internal or external to a system that has the potential to cause harm.

Institutional Safety Discipline Leads. Subject-matter-expert for the safety discipline they oversee who provide determination of compliance with requirements, equivalent levels of safety, and if a requirement is non-applicable.

Out-grant. Real estate agreements granting the use of NASA real property to another party. It discusses requirements and processes for Centers to obtain Headquarters' approval to enter into real estate agreements, including Space Act Agreements and Public-Private/Public-Public Ventures, such as Enhanced Use Leases, Commercial Space Launch Act Agreements, and Commercial Antenna Siting Agreements [source NPR 8800.15]

Public. Any person not directly employed by NASA or a contractor performing NASA work who may be impacted by the hazards associated with NASA activities and operations. Examples of the public include tenants and visitors to a NASA facility and the general public located near a NASA facility/operation.

Submitting Authority. The person or organization seeking relief from a requirement.

Relief from a Requirement. A documented authorization releasing a responsible party from meeting a requirement. [source: Based on NPR 7120.5 definitions for waiver and deviation.]

Safety Culture. The value placed on safety as demonstrated by people's behavior. It is the way safety is perceived, valued and prioritized in an organization. It reflects the commitment to safety at all levels in the organization. It is "how an organization behaves when no one is watching". Safety culture is expressed and observed via individual and group attitudes and behavior, and organizational processes.

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Waiver. A documented authorization releasing a program or project from meeting a requirement after the requirement is put under configuration control at the level the requirement will be implemented. [source NPR 7120.5].

Workforce. Any person directly employed by NASA or a contractor performing NASA work. Note, people directly employed by tenants on a NASA Center are considered public not workforce.

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Appendix B. Acronyms

AHJ	Authority Having Jurisdiction
AMD	Aircraft Management Division
ASME	American Society of Mechanical Engineers
ASO	Aviation Safety Officer
CHMO	Chief Health and Medical Officer
CRFSL	Center Range Flight Safety Lead
DASHO	Designated Agency Safety and Health Official
ESO	Explosives Safety Officer
FPPA	Fall Protection Program Administrator
HOP	Hazardous Operating Procedures or Permit
IAOP	Inter-Center Aircraft Operations Panel
IBC	International Building Code
IEEE	Institute of Electrical and Electronic Engineers
LDE	Lifting Devices and Equipment
LDEC	Lifting Devices and Equipment Committee
LDEM	Lifting Devices and Equipment Manager
LSO	Laser Safety Officer
NF	NASA Form
NFPA	National Fire Protection Association
NPD	NASA Policy Directive
NPR	NASA Procedural Requirements
NRRS	NASA Record Retention Schedules
NSRS	NASA Safety Reporting System
OSHA	Occupational Safety and Health Administration

OSMA	Office of Safety and Mission Assurance
PPE	Personal Protective Equipment
PSM	Pressure Systems Manager
PVS	Pressure Vessels and Pressurized Systems
RSO	Radiation Safety Officer
SMA	Safety and Mission Assurance
UAS	Unmanned Aircraft Systems
VCS	Voluntary Consensus Standard
VPP	Voluntary Protection Program

Appendix C. References

- C.1 Occupational Safety and Health, Duties of Employers and Employees, 29 U.S.C § 654.
- C.2 Occupational Safety and Health Act, 29 U.S.C. § 655.
- C.3 Compliance with Nationally Recognized Codes, 40 U.S.C. § 3312.
- C.4 Protection of Human Subjects, 14 CFR pt. 1230.
- C.5 Occupational Safety and Health Standards, 29 CFR pt. 1910.
- C.6 Safety and Health Regulations for Construction, 29 CFR pt. 1926.
- C.7 Protection of Human Subjects, 45 CFR pt. 46.
- C.8 Commercial Diving Operations, 46 CFR pt. 197 subpt. B.
- C.9 Federal Acquisition Regulations System, National Aeronautics and Space Administration, 48 CFR, ch. 18.
- C.10 54 FR 3904–16, OSHA Safety and Health Program Management Guidelines (1989).
- C.11 NPD 1000.0, NASA Governance and Strategic Management Handbook.
- C.12 NPD 7100.8, Protection of Human Research Subjects.
- C.13 NPD 8700.1, NASA Policy for Safety and Mission Success
- C.14 NPD 8710.1, Emergency Management Program.
- C.15 NPD 8820.2, Design and Construction of Facilities.
- C.16 NPR 1400.1, NASA Directives and Charters Procedural Requirements.
- C.17 NPR 1600.1, NASA Security Program Procedural Requirements.
- C.18 NPR 1800.1, NASA Occupational Health Program Procedures.
- C.19 NPR 4100.1, NASA Supply Support and Material Management.
- C.20 NPR 4200.1, NASA Equipment Management Procedural Requirements.
- C.21 NPR 7900.3, Aircraft Operations Management.
- C.22 NPR 8000.4, Agency Risk Management Procedural Requirements.
- C.23 NPR 8715.3, NASA General Safety Program Requirements.
- C.24 NPR 8715.5, Range Flight Safety Program.

- C.25 NPR 8715.7, Expendable Launch Vehicle (ELV) Payload Safety Program.
- C.26 NPR 8800.15, Real Estate Management Program.
- C.27 NPR 8820.2, Facility Project Requirements.
- C.28 NPR 8831.2, Facilities Maintenance and Operations Management.
- C.29 NASA-STD-8719.7, Facility System Safety Guidebook.
- C.30 NASA-HDBK-8709.24, Safety Culture Handbook.
- C.31 NAI 1050-1, Space Act Agreements Guide.
- C.32 NASA Real Estate Desktop Guide.
- C.33 NASA Desk Guide for Enhanced Use Leasing of Real Property.
- C.34 JPR 8715.2, JSC Safety Standard for Underwater Operations.
- C.35 American Academy of Underwater Sciences, Standards for Scientific Diving.
- C.36 ANSI/ASSP Z10, Occupational Health and Safety Management Systems.
- C.37 ANSI/ASSP Z490.1, Criteria for Accepted Practices in Safety, Health and Environmental Training.
- C.38 CAN/CSA-Z1001-18, Occupational Health and Safety Training - Second Edition.
- C.39 CPL 02-00-100, Application of the Permit-Required Confined Spaces (PRCS) Standard, 29 CFR § 1910.146.
- C.40 CSP 03-01-003, Voluntary Protection Programs (VPP): Policies and Procedures Manual (2008).
- C.41 EM 385-1-1, Safety and Health Requirements Manual, 2014 published by the U.S. Army Corps of Engineers.
- C.42 FSH 4209.11, Wildlife, Fish, Water and Air Research Handbook.
- C.43 ILO-OSH 2001, Guidelines on Occupational Safety and Health Management Systems.
- C.44 ISO 45001:2018(E), Occupational health and safety management systems—Requirements with guidance for use.
- C.45 National Safety Council's (NSC's) Journey to Safety Excellence.
- C.46 NB-23, National Board of Boiler and Pressure Vessel Inspectors, National Board Inspection Code (NBIC), 2019.

C.47 NFPA 1037, Standard on Fire Marshal Professional Qualifications.

C.48 NIOSH Hierarchy of Controls, <https://www.cdc.gov/niosh/topics/hierarchy/default.html>.

C.49 Occupational Safety and Health Training Guidelines for Federal Agencies,
https://www.osha.gov/dep/facosh/osha_training_guidelines2014.pdf.

C.50 OHSAS 18001, Occupational Health and Safety Management.

C.51 OSHA 3885, Recommended Practices for Safety and Health Programs,
<https://www.osha.gov/shpguidelines/>.

C.52 Recommended Practices for Safety and Health Programs, Voluntary Standards Crosswalk.
OSHA,
https://www.osha.gov/shpguidelines/docs/Crosswalk_to_Voluntary_OSHA_Standards_7-3-18.pdf.

C.53 SS521-AG-PRO-010, U.S. Navy Diving Manual.

Appendix D. Example Request For Relief Form

REQUEST FOR RELIEF (RFR)		1. DATE PREPARED: (DD-Mon-YYYY) Click here to enter text.	2. RFR NUMBER: (added by OSMA) Click here to enter text.
		3. PROCURING ACTIVITY NO.: Click here to enter text.	
4. TITLE OF REQUEST: Click here to enter text.			
5. SCOPE AND DURATION OF REQUESTED RELIEF:			
5.a. LIST OF SYSTEMS AND OPERATIONS IMPACTED: Click here to enter text.		5.b. DURATION: Click here to enter text.	
5.c. RELIEF RESULTS IN INCREASED RISK TO SAFETY: <input type="checkbox"/> Yes <input type="checkbox"/> No			
6. REQUIREMENT TO BE RELIEVED	6.a. Document NO.: Click here to enter text.		6.b. Paragraph NO.: Click here to enter text.
	6.c. Requirement Text: Click here to enter text.		
7. DESCRIPTION OF RELIEF REQUEST: Click here to enter text.			
8. NEED FOR RELIEF: Click here to enter text.			
9. CORRECTIVE ACTION TAKEN TO PREVENT FUTURE RECURRENCE: Click here to enter text.			
10. EFFECT ON SAFETY, PERFORMANCE, FUNCTION, RELIABILITY, DURABILITY, INTEGRATED LOGISTICS SUPPORT, INTERFACE, OR SOFTWARE: Click here to enter text.			
11. RECURRENCE	11.a. RECURRING REQUEST?:	11.b. IF YES, PROVIDE RATIONALE: Click here to enter text.	

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		<input type="checkbox"/> Yes <input type="checkbox"/> No	
12. Technical POC		12.a. NAME: Click here to enter text.	12.b..ORG.: Click here to enter text.
		12.c. TELEPHONE: Click here to enter text.	12.d. E-MAIL: Click here to enter text.
13.a. SUBMITTING AUTHORITY (name and title): Click here to enter text.		13.b. SIGNATURE: Click here to enter text.	
BELOW TO BE COMPLETED BY REVIEWERS			
14.a. REVIEWER (name, title, signature):		14.b. RECOMMENDATION:	
Click here to enter text.		<input type="checkbox"/> Approve <input type="checkbox"/> Disapprove	
Click here to enter text.		<input type="checkbox"/> Approve	<input type="checkbox"/> Disapprove
Click here to enter text.		<input type="checkbox"/> Approve <input type="checkbox"/> Disapprove	
Click here to enter text.		<input type="checkbox"/> Approve <input type="checkbox"/> Disapprove	
14.c. DISAPPROVAL RATIONALE:			
BELOW TO BE COMPLETED BY THE APPROVING AUTHORITY			
15.a. DISPOSITION:	<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved		
15.b. DISAPPROVAL RATIONALE: Click here to enter text.			
15.c. NAME AND TITLE: Click here to enter text.	15.d. SIGNATURE: Click here to enter text.	15.e. DATE: (DD-Mon-YYYY) Click here to enter a date.	

Instructions for completing the Requirement Request for Relief (RFR) Form

1. Date Prepared. Enter the submittal, preparation, or revision date of the RFR prepared in the format DD-Mon-YYYY (e.g., 01-Jan-2017).

2. RFR Number. Leave blank, OSMA will assign a headquarters tracking number.

3. Procuring Activity No. To be Entered by the procuring activity to provide an internal processing number, if required.

4. Title of Request: Enter a title to describe the request.

5.a-c. Scope and Duration of Requested Relief. Enter the designation of the system(s) and operation(s) for which the relief is requested and the duration of the request. Check whether the granting relief results in increased risk to safety or no increase in risk.

6.a-c. Requirement to be Relieved. Enter the source document NO.

(including revision letter and change NO. if applicable), the requirement paragraph number, and the requirement text.

7. Description of Relief Request. Enter the description of the relief request. Describe the nature of the proposed departure from the requirement of the source document. Include marked drawings and other documents to describe and justify approval of the request. Provide the impact of other systems, operations, and organizations or programs, as required.

8. Need for Relief. Describe the need for relief from the requirement. Explain why it is not possible, or desirable, to comply with the requirement within the specified delivery schedule. Also, if applicable, explain why a relief request is proposed in lieu of a permanent design change.

9. Corrective Action Taken to Prevent Future Recurrence. Describe any action(s) taken to prevent a future recurrence of this request.

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10. Effect on Safety Performance, Function, Reliability, Durability, Integrated Logistics Support, Interface, or Software. Describe the changes in performance allocations and in the function and physical interfaces defined in the system specification. Describe the effects of the proposed change on employment, deployment, logistics, and personnel and training requirements that have been specified in the approved system, including any change or effects on the operability of the system. In particular, there is to be an entry detailing any effect on interoperability.

11.a-b. Recurrence. If the same relief has been requested previously, check “Yes” or check “No” otherwise. If block 11.a. is “Yes”, provide justification for the recurrence of this relief and explain why previous corrective actions did not prevent it from recurring.

12.a-d. Originating Activity. Enter the name, organization, telephone number, and email of the technical point of contact for the RFR.

13.a-b. Submitting Authority. Enter the Submitting Authority, name, title, and signature of the individual authorized to request the RFR. Signature indicates the requester accepts the risk associated with this RFR.

14.a-b. Recommendations. Enter the name, title, signature, date signed, and recommended disposition for each reviewer. If a reviewer recommends disapproval, rationale should be provided in 14.c.

15.a. Disposition. Check the appropriate box to indicate the final disposition of the RFR.

- Approved – RFR is approved as submitted;
- Disapproved – RFR is disapproved;

15.b. Disapproval Rationale. provide the rationale behind the disapproval recommendation.

15.c-e. Disposition. Enter the **Name, Title, Signature, and Date** signed. This block is to be completed by the Approving Authority. Signature indicates the request was reviewed and the request for relief either approved or disapproved.

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